भारतीय मानक
Indian Standard

IS 16187 : 2014

(Reaffirmed 2018)

वस्त्रादि — फल और सब्जियों की पैकजिंग और भंडारण के लिए उच्च घनत्व पोलीइथाइलीन (एच.डी.पी.ई.)/ पोलीप्रोपाइलीन (पी.पी.) के बुने हुए लीनो बोरे — विशिष्टि

Textiles — High Density Polyethylene (HDPE)/ Polypropylene (PP) Leno Woven Sacks for Packaging and Storage of Fruits and Vegetables — Specification

ICS 55.080; 67.080

© BIS 2014

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली–110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

March 2014 **Price Group 4**

Textile Materials Made from Polyolefins (Excluding Cordage) Sectional Committee, TXD 23

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Materials Made from Polyolefins (Excluding Cordage) Sectional Committee had been approved by the Textile Division Council.

High density polyethylene (HDPE)/Polypropylene (PP) leno woven sacks are used for packing and storage of fruits and vegetables. This standard has been prepared to help the users and traders of leno woven bags in proper packaging and storage of fruits and vegetables.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — HIGH DENSITY POLYETHYLENE (HDPE)/ POLYPROPYLENE (PP) LENO WOVEN SACKS FOR PACKAGING AND STORAGE OF FRUITS AND VEGETABLES — SPECIFICATION

1 SCOPE

This standard prescribes the requirements of high density polyethylene (HDPE)/polypropylene (PP) leno woven sacks for packaging and storage of fruits and vegetables. The fabric used in the manufacture of leno sacks shall be woven on circular or flat looms.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 MANUFACTURE

3.1 Raw Material

The tape shall be manufactured from virgin food grade high density polyethylene (HDPE)/polypropylene (PP) conforming to the material properties requirements specified in IS 7328 and IS 10910 respectively. As agreed between the buyer and the seller, coloured tapes shall be manufactured using colour masterbatch conforming to the material properties requirements as specified in IS 9833. If required by buyer, the tapes shall be manufactured from combination of HDPE/PP with LLDPE/LDPE to get desired softness. Tapes shall also be manufactured from UV stabilized HDPE/PP if desired by the buyer.

3.2 Fabric

The fabric used in the manufacture of HDPE/PP leno woven sacks shall be woven as a tube on circular loom from HDPE/PP tapes having width in the range of 2.0-2.5 mm confirming to the requirements specified in IS 6192 and IS 11197. The linear density of HDPE/PP tapes shall be 67 tex (600 denier). The denier of HDPE/PP tape used in the manufacture of leno woven fabric/sacks shall be subjected to the following tolerances:

a) 10 percent on individual value, and

b) 5 percent on average.

The fabric shall be woven in accordance with leno weave with low weave density. The constructional particulars of fabric are given in Table 1.

Leno weave is a weaving pattern in which adjacent warp tapes are twisted around consecutive weft tapes to form a spiral pair, effectively locking each weft in place. The paired warp tapes look like figure '8' as shown schematically in Fig. 1.

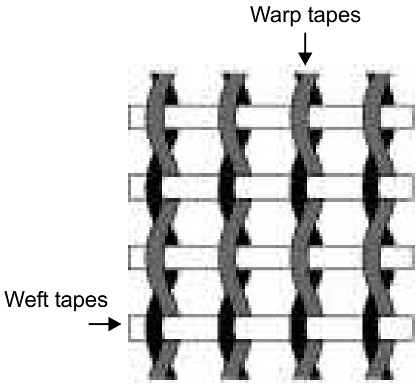


FIG. 1 SCHEMATIC REPRESENTATION OF LENO WEAVE PATTERN

3.3 Sack

3.3.1 *Seam*

Leno sacks fabricated out of woven fabric shall have seam at the bottom and/or side. The stitching shall be done with two rows of either lock stitch or chain stitch. The two rows of stitches shall be separated from each other by about 5 mm and the outer row of stitching shall be approximately 8 mm from the outer edge of the sack. The stitching shall be done with single fold or double fold over seam to a depth of 25 mm, so that the stitches pass through a minimum of four or six layers of the fabric respectively as the case may be. The number of stitches/dm shall be 14 ± 2. The lock or chain stitches shall be as given in IS 10789.

3.3.2 *Stitching Thread*

The material used for stitching shall be HDPE/PP tape or any other thread suitable for the purpose, compatible to the product being packed in the sack. The tape or thread used for stitching shall have at least 20 percent higher denier than that used for making of the sack. The stitching shall be uniform without any loose thread or knot.

3.3.3 *Bag Mouth*

The completely open mouth of the sack shall be hemmed with a fold of minimum 25 mm and tapes shall not fray. Leno woven sacks shall be made available with a drawstring if required by the buyer. The drawstring shall be made of HDPE/PP narrow woven tapes or flat braided cords.

3.3.4 *Bag Dimensions and Carrying Capacity*

Type 1, sacks shall have nominal holding capacities of 25 kg and Type 2, sacks shall have nominal holding capacities of 50 kg as given in Table 1. The dimensions of the leno woven sack shall be as agreed to between the buyer and the seller depending on shape, size and bulk density of the fruit or vegetables to be packed.

4 REQUIREMENTS

4.1 Sack Specifications

The leno sacks shall confirm to the requirements specified in Table 1.

4.2 UV Resistance

As agreed to between the buyer and the seller, the leno bags shall be made from UV stabilized HDPE/PP. The leno woven fabric or sacks made out of UV stabilized material shall have at least 50 percent of the original breaking strength when tested after exposure to UV radiation as per the method given in Annex B.

4.3 Mass of Bale

The mass of bale of sacks (excluding packing materials) shall be within ± 3 percent of the mass calculated by multiplying the number of sacks with the average mass of sack specified in Table 1 or as agreed to between the buyer and seller.

4.3.1 The method of calculating the mass of the sacks is given in Annex C for guidance.

5 LABELLING, PACKING AND MARKING

5.1 Labelling on Sacks

A printed label black/dark blue in colour (*see* IS 9833) with identification mark of sack manufacturer, recycling logo along with the information as required by the buyer or law in force using suitable ink or by flexography shall be stitched at appropriate place on the woven sacks.

5.2 Packing

The sacks shall be packed to form a bale using a covering layer of plastic woven fabric and suitably secured. The bale shall contain sacks as agreed to between the buyer and the seller preferably 500 and in multiples of 100 thereafter.

Table 1 Requirements of HDPE/PP Leno Woven Sacks for Packing Fruits and Vegetables

(*Clauses* 3.3.4, 4.1 *and* 4.3)

Sl No.	Characteristic(s)	Requirement(s)		Tolerance	Method of Test, Ref to
		Type 1	Type 2		
(1)	(2)	(3)	(4)	(5)	(6)
i)	Capacity	25 kg	50 kg		
ii)	Dimensions, cm				IS 1954
	a) Inside length	As agreed to between the buyer and the seller	As agreed to between the buyer and the seller	+ 20 mm – 10 mm	
	b) Inside width	As agreed to between the buyer and the seller	As agreed to between the buyer and the seller	+ 20 mm – 10 mm	
iii)	Mass of fabric, g/m^2	45	45	± 6 percent	IS 1964
iv)	Ends per dm	40	40	± 2	IS 1963
v)	Picks per dm	20	20	± 2	IS 1963
vi)	Average breaking strength of fabric (cut strip method), N (kgf), *Min* (*see* notes 1 and 2);				IS 1969 (Part 1)
	a) Lengthwise	530 (54)	530 (54)		
	b) Widthwise	265 (27)	265 (27)		
vii)	Average breaking strength of bottom /side seam (cut strip method), N (kgf), *Min* (*see* notes 1 and 2)	295 (30)	295 (30)		IS 9030

NOTES

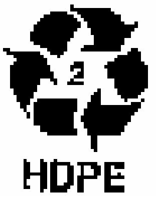
1 Width of cut strip = 50 mm, Gauge length = 200 mm.

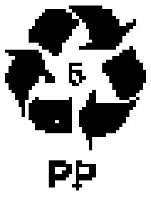
2 1N = 0.102 kgf (approx).

5.3 Marking

The bales shall be marked with the following information:

a) Name of the manufacturer,
b) Type and size of sacks,
c) Gross weight,
d) Net weight,
e) Month and year of manufacture,
f) Any other information required by the buyer, and;
g) Recycling logo as given below for HDPE/PP sacks as the case be:





5.4 BIS Certification Marking

Each bale containing PP leno sacks may also be marked with the Standard Mark.

5.4.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 ATMOSPHERIC CONDITIONS, CONDITIONING AND TESTING

Prior to test, the specimens shall be conditioned to moisture equilibrium from dry side in the standard atmosphere of 65 ± 2 percent relative humidity and 27 ± 2°C temperature as laid down in IS 6359.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Lot

All sacks of the same construction in a consign-ment shall be grouped together to constitute a lot.

7.2 Lot Conformity

The conformity of the lot to the requirements of the standard shall be determined on the basis of the test carried out on the samples selected from it.

7.3 Sample Size

The number of samples to be selected depends on the size of the lot and number of bales to be sampled shall be in accordance with col 2 and col 3 of Table 2. The number of sacks to be selected from the bales sampled shall be in accordance with col 4 of Table 2 for visual inspection, dimensions, ends, picks and mass requirements. The number of sacks shall be in accordance with col 5 of Table 2 for breaking load of fabric and seam strength requirements. The number of sacks to be selected for breaking strength of sacks after exposure of UV radiation shall be in accordance with col 6 of Table 2.

7.4 Criteria for Conformity

The lot shall be considered as conforming to the requirements of the standard if the following conditions are satisfied:

a) The number of defective sacks in case of visual inspection, ends, picks and dimensions is up to 10 percent of the sample size subject to rounding off the fraction to next higher integer.
b) None of the bales of sacks weighs less than the respective lower specified limit after allowing tolerance of ±6 percent on individual

Table 2 Sample Size and Criteria for Conformity

(*Clause* 7.3)

Sl No. (1)	No. of PP/HDPE Sacks in a Lot (2)	No. of Bales to be Sampled (3)	Sample Size for Visual Inspection, Dimensions, Ends, Picks and Mass Requirements (4)	Sample Size for Breaking Strength of PP/HDPE Fabric before Exposing to UV Radiation and Breaking Strength of Seam Requirements (5)	Sample Size for Breaking Strength of PP/HDPE Fabric after Exposing to UV Radiation Requirement (6)
i)	Up to 12 500	3	13	8	1
ii)	12 501 to 25 000	5	20	8	1
iii)	25 001 to 50 000	8	32	13	2
iv)	50 001 and above	12	50	20	2

sack and ± 3 percent on the bale (*see* **4.3**).

c) The average breaking strength of fabric in both lengthwise and widthwise direction is not less than the value specified and none of the individual value is more than 10 percent below the specified value. The test shall be carried out on samples selected randomly from different portion of the sack.

d) The average seam strength is not less than the value specified and none of the individual value is more than 10 percent below the specified value.

e) None of the samples after exposure to UV radiation and weathering shall have breaking strength less than 50 percent of the original breaking strength.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1954 : 1990	Determination of length and width of woven fabrics — Methods (*second revision*)
1963 : 1981	Methods for determination of threads per unit length in woven fabrics (*second revision*)
1964 : 2001	Textiles — Methods for determination of mass per unit length and mass per area of fabrics (*second revision*)
1969 (Part 1) : 2009	Textiles — Tensile properties of fabrics — Determination of maximum force and elongation at maximum force: Part 1 Strip method (*third revision*)
6192 : 1994	Textiles — Monoaxially oriented high density polyethylene tapes — Specification (*second revision*)
6359 : 1971	Method for conditioning of textiles
7328 : 1992	High density polyethylene materials for moulding and extrusion — Specification (*second revision*)
9030 : 1979	Method for determination of seam strength of jute fabrics including their laminates.
9833 : 1981	List of pigments and colourants for using plastics in contact with food stuff, pharmaceuticals and drinking water
10789 : 2000	Textiles — Stitch types — Classification and terminology (*first revision*)
10910 : 1984	Polypropylene and its copolymer for its safe use in contact with food stuffs, pharmaceuticals and drinking water
11197 : 1985	Specification for monoaxially oriented polypropylene tapes

ANNEX B

(*Clause* 4.2)

UV RESISTANCE TEST

B-1 TEST CONDTIONS

The test shall be carried out with fluorescent UV-B lamp.

The duration of the test shall be 144 h (that is six days). The test cycle shall be 8 h at 60°C ± 3°C with UV radiation alternating with 4 h at 50°C ± 3°C with condensation. The test shall be carried out with set irradiance of 0.63 W/m^2/nm.

B-2 TEST PROCEDURE

Specimens are alternately exposed to ultraviolet light alone and to condensation repeatedly.

Condensation is produced by exposing the test surface to a heated saturated mixture of air and water vapour, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

ANNEX C

(*Clause* 4.3.1)

METHOD FOR CALCULATION OF MASS OF SACKS

C-1 CALCULATION OF MASS OF LENO SACKS

C.1.1 Total mass of sacks comprises of:

a) Mass of fabric;

b) Mass of stitching tape or threads

C.1.1.1 Calculate the mass of sacks with the help of the following formula as the case may be:

a) Mass of tubular fabric:

  1) Single fold stitching $= (L + 30\text{ mm} + 25\text{ mm}) \times 2W \times M \times 10^{-6}$

  2) Double fold stitching $= (L + 55\text{ mm} + 25\text{ mm}) \times 2W \times M \times 10^{-6}$

b) Mass of flat fabric:

  3) Single fold stitching $= (L + 30\text{ mm} + 25\text{ mm}) \times 2\,(W + 30\text{ mm}) \times M \times 10^{-6}$

  4) Double fold stitching $= (L + 55\text{ mm} + 25\text{ mm}) \times 2\,(W + 55\text{ mm}) \times M \times 10^{-6}$

c) Mass of stitching tape or thread $= L_1 \times T \times 10^{-6}$

where

L = length of sack, in mm;

L_1 = approximate length of stitching tape or thread, in mm (top and bottom stitch);

W = width of sack, in mm;

M = mass of fabric, in g/m^2 and

T = linear density of stitching tape, in tex.

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Textile Materials Made from Polyolefins (Excluding Cordage) Sectional Committee, TXD 23

Organization	*Representative*(*s*)
Indian Institute of Packaging, Mumbai	Prof N. C. Saha (***Chairman***) Shri T. M. Malik (*Alternate*)
All India Flat Tape Manufacturers' Association, New Delhi	Shri Lalit K. Tulsiyan
Cement Manufacturers Association, New Delhi	Representative
Central Institute of Plastics Engineering & Technology (CIPET), Chennai	Representative
Chemical and Petrochemicals Manufacturers Association, New Delhi	Shri Dhanajay Sahoo Shri Mahinder Singh (*Alternate*)
Consumer Education Research Centre, Ahmedabad	Dr M. M. Gharia Ms Anindita Mehta (*Alternate*)
Department of Chemical & Petrochemical, New Delhi	Dr T. K. Chakravarthy Shri A. K. Agarwal (*Alternate*)
DGS&D, New Delhi	Additional Director General, QA
Directorate of Sugar, New Delhi	Shri Rajan Sehgal Shri Suresh Chandra (*Alternate*)
Food Corporation of India, New Delhi	Dr G. P. Pandey Shri N. C. Gautam (*Alternate*)
GAIL, New Delhi	Shri Rajneesh Yadav Shri Kuldeep Negi (*Alternate*)
Gujarat Narmada Valley Fertilizers Co Ltd, Narmadanagar	Shri Girish M. Patel Shri C. B. Dave (*Alternate*)
Haldia Petrochemical Ltd, Kolkata	Shri Raj K. Datta Shri Gourhari Samanta (*Alternate*)
Indian Sugar Exim Corporation Ltd, New Delhi	Shri M. G. Joshi Shri Rajiv Aggarwal (*Alternate*)
Indian Sugar Mills Association, New Delhi	Shri G. K. Thakur Shri Pankaj Rastogi (*Alternate*)
Lamifabs & Papers (P) Ltd, Aurangabad	Shri Kamlesh Dhoot Shri Kishori Lal Dhoot (*Alternate*)
Lohia Corp Ltd, Kanpur	Shri Ashok Kumar Bhatnagar Shri Rajeev Kumar Dwivedi (*Alternate*)
Jai Corp Limited, Mumbai	Shri Vasudeo S. Pandit
Mega Flex Plastics Limited, Kolkatta	Shri Hukum Chand Bothra Shri Rakesh Sethia (*Alternate*)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	Shri Ashok Kumar Dr. Subhash Gupta (*Alternate*)
Office of the Textile Commissioner, Mumbai	Shri B. B. Bharti Shri Sourabh Kulkarni (*Alternate*)
Plastindia Foundation, Mumbai	Shri Surender Choudhary Shri L. K. Singh (*Alternate*)
Reliance Industries Ltd, Mumbai	Dr U. K. Saroop Dr. Sunil Mahajan (*Alternate*)
Texel Industries Ltd, Halol	Shri Shailesh R. Mehta Shri Sushil Pachisia (*Alternate*)
The Fertilizer Association of India, New Delhi	Dr D. S. Yadav Dr. R. K. Tewatia (*Alternate*)
Vijay Chemicals & Plastics Pvt Ltd, Vadodara	Shri V. Sreenivasan Shri Anup Gopalkar (*Alternate*)

Organization	*Representative*(*s*)
Wopolin Plastics Ltd, Nagpur	Shri Vinod K. Bajaj Shri K. N. Baiswar (*Alternate*)
BIS Directorate General	Shri Prabhakar Rai, Scientist ‘E’ and Head (TXD) [Representing Director General (*Ex-Officio*)]

Member Secretary
Shri J. K. Gupta
Scientist ‘C’ (TXD), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: TXD 23 (0906).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central :	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern :	1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern :	SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843 260 9285
Southern :	C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western :	Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi